Exemption No. 7088

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98055-4056

In the matter of the petition of

CONSTRUCCIONES AERONAUTICAS, S.A. (CASA)

for an exemption from § 25.723 of Title 14, Code of Federal Regulations

Regulatory Docket No. 29871

PARTIAL GRANT OF EXEMPTION

By letter dated December 1, 1999, your reference #CT-3-C-TC5/FA/295, Mr. Mario Muñoz Baragaño, Airworthiness and Certification Manager, CONSTRUCCIONES AERONAUTICAS, S.A. (CASA), Direccion de Proyectos y Sistemas, Aptdo. 1 (Getafe-Madrid), P. John Lennon, s/n, petitioned the Federal Aviation Administration (FAA) for a time limited exemption from § 25.723 of Title 14, Code of Federal Regulations (14 CFR). The proposed exemption, if granted, would permit CASA to have one additional year to demonstrate compliance with § 25.723 for the CASA Model C-295 landing gear system.

The petitioner requests relief from the following regulations:

> **Section 25.723**, Shock absorption tests, as amended by Amendment 25-72, requires, in pertinent part, it be shown that the design landing loads will not be exceeded. Paragraph 25.723(a) states, in pertinent part, "This must be shown by energy absorption tests except that analyses based on earlier tests conducted on the same basic landing gear system which has similar energy absorption characteristics may be used for increases in previously approved takeoff weights." Paragraph 25.723(b) requires that the reserve energy capacity of the gear be demonstrated by tests.

The petitioner's supportive information is as follows:

"CONSTRUCCIONES AERONAUTICAS, S.A. (CASA) has not yet shown compliance to FAR §25.723 for the C-295 landing gear system and thereby petitions for a time limited exemption to this requirement. The C-295 landing gear system is a modified version of the of the CN-235 landing gear system. Section 25.723, Amendment 25-72, requires that energy absorption tests be used to show that limit load factors selected for design will not be exceeded, except that analyses based on earlier tests conducted on the same basic landing gear system which has similar energy absorption characteristics may be used for increases in previously approved takeoff and landing weights.

"CASA believes that the modified landing gear is still the 'same basic landing gear system' within the meaning of the requirement and have used analysis based on the previous tests to show that the design landing load factors will not be exceeded. CASA has pursued the certification program under this presumption and are now within a few weeks of the expected date for type certification. However, the Federal Aviation Administration has recently reviewed the landing gear design and believes that the landing gear system changes are too extensive to rely solely on the previous analyses and shock absorption tests. According to the FAA, to show compliance to FAR 25.723, Amendment 25-72, would require landing gear shock absorption testing. This would require at least a year to accomplish. CASA is requesting a time limited exemption of one year to complete the demonstration of compliance with § 25.723."

Safety Considerations

"CASA believes that the granting of this time limited exemption will not adversely affect public safety since the alleged deficiencies are in the degree of compliance demonstration and not necessarily with the CASA C-295 airplane design. Furthermore, the airplane has been tested in flight to landings to demonstrate abusive descent rates. During one of these severe maneuvers, which exceeded limit design requirements, the landing gear did not fail and the resulting loads were closely predicted by the existing analytical model. Consequently the risk is very low that design loads would be exceeded during the exemption period."

Public Interest

CASA believes that the granting of this temporary exemption is in the public interest because safety would not be affected during the exemption period and it would allow timely delivery of customers airplanes. Timely delivery of these airplanes to contracted customers would be in the public economic interests through the US companies that have contracts to build major components of the CASA Model C-295 airplane. Serious financial burdens could result to these companies and their employees, and consequently, the peripheral public from the inability to honor these commitments.

Waiver of Publication and Comment Period

"CASA is fully committed to developing a solution that will provide for full compliance to FAR 25.723 within the exemption period. CASA, therefore requests that the Administrator find good cause to reduce the public notification and comment procedures . . . for petition submission at least 120 days prior to the proposed effective date of the exemption to allow time to meet scheduled deliveries. CASA requests that action on this petition not be delayed by publication and comment procedures for the following reasons: (1) a grant of exemption would not set a precedent in that it is for a time extension from [demonstrating compliance to] a requirement and not permanent relief from the requirement and, therefore, does not create a public safety issue, and (2) a delay in acting on this petition would result in serious economic loss to US contractors and their employees."

The FAA's analysis/summary is as follows:

Requirements of § 25.723

Section 25.723, Shock absorption tests, provides for two types of tests. Paragraph (a) of this section requires the applicant to show that the airplane limit landing load factors will not be exceeded at the design limit descent velocity of 10 fps. Paragraph (b) requires the applicant to demonstrate, by test, a reserve energy capacity in a 12 fps descent. The demonstration of paragraph (a) must be accomplished by test, except that increases in previously approved weights can be shown by analysis validated by tests on the "same basic landing gear system" that show "similar" energy absorbing characteristics.

Prior to Amendment 25-72, paragraph (a) allowed analysis to be used if it was validated by tests on the same basic landing gear system with "identical" energy absorbing characteristics. As stated in Notice 84-21 (49 FR 47358), dated December 3, 1984, the reason for this change was to recognize that in order to accommodate weight increases, certain "minor design changes" and "slightly altered energy absorption characteristics" were often necessary. Specific examples cited in Notice 84-21 are metering pin alterations and tire rating changes. The objective of the amendment was to allow for the approval, without testing, of weight increases on existing designs, not the approval of redesigned landing gear systems.

Summary of Differences

For compliance with § 25.723, the applicant proposes to use analysis to demonstrate that limit landing load factors selected for design for the Model C-295 will not be exceeded based on energy absorption tests conducted on the earlier Model CN-235 landing gear. The applicant provides a comparison between Model CN-235 and Model C-295 landing gear designs. This comparison shows that the main landing gear for the Model C-295 airplane differs from that of Model CN-235 as follows:

1. The design landing weight is increased by 46 percent on the Model C-295.
2. The diameter of the shock absorbing chamber is increased by 21 percent on the Model C-295.
3. A nitrogen/oil separator is incorporated on the landing gear.
4. The landing speeds are increased on the Model C-295.
5. A larger diameter wheel and tire are used on the Model C-295.
6. The oil damping coefficient is increased by 32 percent on the Model C-295.

This comparison also shows that the nose landing gear for the Model C-295 airplane differs from that of the Model CN-235 as follows:

1. The Model C-295 has a twin wheel system versus the earlier single wheel system.
2. The Model C-295 has an increased Nitrogen/oil volume ratio.
3. The Model C-295 has a nitrogen/oil separator incorporated on the landing gear.
4. The Model C-295 has an oil damping coefficient that is increased by 15 percent.

The FAA is not convinced that, with the changes to the Model CN-235 landing gear for the Model C-295, the landing gear is still "the same basic landing gear system," within the meaning of § 25.723(a). Although it is true that certain dimensions of the landing gear are not changed, certain others are changed significantly. The changes to the shock absorber do not appear to be the kind of changes for which the effects can be adequately considered with the mathematical simulation proposed by CASA. For example, the restrictor in the Model C-295 nose landing gear is an unsprung component, whereas in the Model CN-235 it is a sprung component with a flow metering pin through it. This, and other kinds of changes in the shock absorbers, (including the incorporation of the separator pistons even though they may not be there specifically to improve energy absorption, and the increase in diameter of the main gear shock absorbers), are not within the scope of what the FAA would consider "the same basic landing gear system" for which analysis can be used to account for the changes.

Analytical Validation

CONSTRUCCIONES AERONAUTICAS, S.A. (CASA), also provides a comparison between their analysis of the Model CN-235 energy absorption test and the actual test results. This analysis consists of a numerical simulation of the load-stroke time history of an energy absorption test. The analysis results did not closely match the actual Model CN-235 energy absorption tests. CONSTRUCCIONES AERONAUTICAS, S.A. (CASA), argues, however, that even though the results differ, the analysis consistently over-predicted the magnitude of the loads for the critical Model CN-235 design conditions and should be capable of producing conservative results for the Model C-295 as well. Although the FAA recognizes that the analysis may have produced conservative results for the Model CN-235, this may not remain the case for the Model C-295 airplane.

CONSTRUCCIONES AERONAUTICAS, S.A. (CASA), also provides a correlation of their analysis with measured loads from a severe landing that occurred during flight testing. Although the FAA is somewhat encouraged with the correlation achieved

between analysis and flight test data, the FAA notes that such tests are not used for compliance with § 25.723, because the controls on such testing are not nearly as good as in an energy absorption test. In particular, in a flight test, it is difficult to know how much lift is on the airplane during the landing. The FAA does not consider good correlation of analysis and flight test to be acceptable in lieu of good correlation of analysis and existing energy absorption tests. If an analytical model is valid, it should be able to make better predictions in more closely controlled energy absorption testing than in flight testing, and CASA's data does not show this to be the case.

Effect on Safety

Although CASA's arguments concerning the adequacy of the Model C-295 landing gear were not sufficient to establish compliance with § 25.723, the FAA recognizes that the arguments have merit in regard to the safety of the aircraft during the exemption period. Actual descent rates in transport airplane operation are significantly less than the design descent rate that leads to the landing load factors in question. An actual descent rate near the level of the limit descent rate would be a rare event, and would not be expected to occur more than once in the lifetime of an airplane. CASA's information is sufficient to show that the landing gear is not likely to be under strength, at least to an extent that would constitute a serious risk during a single year of operation. It should also be noted that the Model C-295 will not be operating as a civil airplane during the life of the exemption.

Public Interest

As discussed previously, it is not anticipated that the subject airplane will be operated during the life of this exemption. In fact, the airplane is not scheduled for its first delivery until after this exemption expires. Normally under these circumstances, the FAA would simply withhold issuance of the type certificate until full compliance has been demonstrated. In this case, however, CASA indicates that its obtaining a U.S. type certificate is a prerequisite for eligibility to obtain a contract to sell the airplane, and that such a delayed certification would render CASA ineligible.

Although these types of commercial interests are generally not considered to be appropriate considerations in determining whether an exemption is in the public interest, this certification program presents circumstances from which the FAA concludes that a partial grant of exemption is in the public interest. Specifically, the FAA recognizes that CASA presented the basic design concept, including the landing gear redesign, early in the type certification process.

A review of this program's history indicates that the FAA had been provided data and was aware, at least as of October 1997, that the landing gear had been redesigned sufficiently so that a drop test may be required. Under normal certification procedures, the appropriate action at that time would have been for the FAA to initiate an issue paper to apprise CASA of this concern and to begin the process for resolving the issue. If the FAA had followed this course, the issue would have been raised and resolved in

sufficient time to allow for any necessary testing well in advance of the anticipated certification date. However, the FAA did not raise this issue until much later in the program, at which time there was insufficient time to allow for testing before the anticipated certification date. It is also noted that, throughout the program and especially once the issue was raised, CASA has been very cooperative in providing additional design information when requested by the FAA.

Therefore, because of the FAA's failure to follow its own procedures, and without any contributing failure on the part of CASA, CASA has been placed in a position, in the absence of this exemption, of being disqualified from competing for a commercially valuable contract. The FAA finds that there is a strong public interest in maintaining the fairness, predictability, and reliability of the FAA's type certification process. Therefore, a partial grant of a time limited exemption to enable CASA to demonstrate full compliance with the applicable regulation, while at the same time allowing CASA to compete for the contract, is in the public interest.

Waiver of Publication of Summary

The petitioner requests that action on its request not be delayed for publication and comment procedures in the Federal Register. The granting of this exemption without a public comment period would set a precedent, but the effect of the precedent is minimal because the exemption is time-limited to allow the petitioner to show compliance, rather than to permanently approve a non-compliance, and would primarily affect only the petitioner. In addition, CASA responded with the petition for exemption as soon as the FAA raised the non-compliance issue.

In consideration of the foregoing, I find that a partial grant of exemption is in the public interest and will not significantly affect the level of safety provided by the regulations and that good cause has been shown for forgoing the public comment period. Therefore, pursuant to the authority contained in 49 U.S.C. §§ 40113 and 44701, delegated to me by the Administrator (14 CFR 11.53), CONSTRUCCIONES AERONAUTICAS, S.A. (CASA) is granted a partial exemption from 14 CFR § 25.723 to the extent necessary to permit type certification of the Model C-295 airplane with the following provisions:

1. Within 2 months from the issue date of this partial grant of exemption, the petitioner shall submit through the Direction General of Civil Aviation (DGAC), of Spain, to the FAA for approval, a schedule and plan acceptable to the FAA for demonstrating full compliance to the requirements of § 25.723.

2. The petitioner, through the DGAC, of Spain, shall keep the FAA apprised of the progress toward, and the final demonstration of, full compliance with § 25.723

3. Upon successful completion of the demonstration of compliance to the requirements of § 25.723 14 CFR, the petitioner shall provide the DGAC of Spain and the FAA with information concerning design changes, if any, needed to meet the requirements of the

certification basis, and a schedule for assuring that the affected CASA Model C-295 fleet will be retrofitted before December 31, 2000.

4. In accordance with 14 CFR 21.51, if compliance with § 25.723 is not demonstrated by December 31, 2000, then the type certificate issued for CASA Model C-295 US registered airplanes is automatically terminated.

This partial grant of exemption expires December 31, 2000.

Issued in Renton, Washington, on December 17, 1999.

/s/ Donald L. Riggin
Donald L. Riggin
Acting Manager
Transport Airplane Directorate
Aircraft Certification Service, ANM-100